Not Just Red and White: Wine Expertise Influences Wine Color Descriptions

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ABSTRACT

The linguistic relativity debate has often focused on how languages differ in the coding of sensory perceptions. Sensory expertise of some cultures possibly increases the consistency of their language's sensory coding. To analyze the effects of sensory expertise within cultures, wine experts and non-experts were tested in color naming and categorization in a neutral and expert context. Wine expertise influenced color naming in both contexts, but not categorization. Experts decreased in consistency while using more specific color terms. This shows that expertise can influence language and that verbal and non-verbal domains are affected differently.

Keywords

Linguistic relativity, culture, color, wine, expertise.

INTRODUCTION

The debate of linguistic relativity started with Benjamin Whorf, who was first to propose that people of different native languages might think differently. This has often been studied by looking at how different languages categorize and code color[1]. Color perception is defined by physiological aspects that are universal[2]. Thus, color categories across languages seem to follow some universal trends[3]. Still, languages differ in how they segment the color space into groups of colors[4]. Westernized cultures are especially precise in their color coding[5]. For example, English speakers and Non-western Jahai speakers (hunter-gatherer community in South-East Asia) both show consistency in the use of their color terms, i.e. they agree on which color terms to use. However, the consistency of English speakers is higher[6]. This does not apply to sensory perceptions such as smell. Verbalizing smell perceptions in English is difficult[7]. It is considerably easier for people who speak Jahai as their language possesses more than twelve smell terms[8].

A possible explanation for such differences in vocabulary and variation in number of perception terms is variation in culture-specific involvements. Vision, and color as part of the visual sense, is important in many cultures and - literally - the most talked about. Olfaction, however, consistently ranks low regarding the number of smell perception terms[9]. When languages do possess olfactory terms it is indeed linked to specific cultural involvement: for the Jahai smell perception and knowledge is incredibly important in daily life[8]. Not only is the number of perception terms increased, but the Jahai also display a consistency in the smell terms they use that is comparable to their consistency for naming colors[6]. This suggests that due to cultural importance and involvement with a sense people might become experts in coding these sensory perceptions. Thus, sensory expertise might enhance vocabulary and improve the consistency with which sensory perceptions can be described.

There are also differences in sensory expertise within cultures. Certain expert groups can have a special involvement with a certain sense[7]. A field of sensory expertise that focuses on multiple senses is wine expertise. Wine descriptions rely heavily on sensory perceptions[10]. If differences in expertise between cultures were to influence vocabulary and consistency, the question arises, what effects differences in expertise within a culture might have. Following the tradition of studying linguistic relativity effects by comparing color cognition, this study focuses on how within-culture differences in expertise affect linguistic and non-linguistic color cognition. Color is mentioned in wine descriptions, but usually less than other sensory perceptions[10]. Thus, little is known about how the color of wine is described. Based on the idea that sensory expertise increases consistency, wine experts should be more consistent in their wine color descriptions, i.e. agree more on which color terms they use to describe which color. This expectation would fit the impression that wine experts potentially shape their own language community[11]. Similarly, coffee experts use vocabulary that is not understood by non-experts[12]. However, there is also reason to assume that expertise decreases consistency: when describing wine perceptions in general, experts have been found to either be vague[13] or very specific[11,14] and precise[15]. Additionally, experts can be very elaborate and use many descriptive terms[14]. If these characteristics also apply to wine color descriptions, there might be more variation among experts and consequently a decrease in consistency.

In both cases of either increased or decreased consistency, experts should differ from non-experts. This comparison is a within-culture and within-language comparison since both speak the same language, even if wine experts might potentially shape their own language community[11]. Their community is based on the common reference of wine and wine is generally perceived in a wine glass shape. This shape can even affect wine color perception[16]. Therefore, to answer the question to what extent sensory expertise in the form of wine expertise influences naming and categorization of wine color, this study will analyze color naming and categorizing of wine experts as compared to non-experts in both an expert and a neutral context. It is hypothesized that during a color naming task these contexts will elicit different descriptions from the experts, whereas non-experts are not expected to differ in their descriptions depending on the context. It is also hypothesized that the descriptions of wine experts will be more specific, again only for colors presented in the expert context. Lastly, because categorization of color can be influenced by learning new color terms[17] a pile sorting task will be used to study categorization. It is expected that experts will categorize wine colors differently than non-experts, mainly those presented in the expert context.

METHODS

Participants and Material

The participants were 12 German wine experts and 16 German non-experts. Experts ranged in age from 29 to 76 years (M=49.17; SD=15.862) and non-experts from 35 to 75 years (M=58; SD=16.545). Their difference in mean age was not significant, $t(26)=1.423$, $p=.167$. The experts and non-experts were approached and asked to participate in stores and vineyards in two German cities. All participated voluntarily and received two little gifts worth 5 Euro. A wine knowledge test, used in a previous study[18] was translated into German in order to verify that the experts were indeed experts in the field of wine, but non-experts were not. Experts scored significantly higher on wine knowledge than non-experts, $t(26)=8.741$, $p<.001$.

The materials of this study were a questionnaire and 48 stimulus cards. The questionnaire contained demographic questions (age, nationality, profession, color-blindness) and the wine knowledge test. The stimulus cards each displayed a standardized Color-Aid color on a light grey background. The colors were chosen by matching the color sheets to red and white wine colors found in German wine literature[19,20]. Half of the cards displayed white wine colors and half displayed red wine colors. They were presented either in a neutral context (box shape) or in a wine-related context (wine glass shape).

Design and Procedure

This study had two independent variables: the between-participant factor expertise (wine expert/non-expert) and the within-participant factor shape (wine glass/box). Therefore, this study had a mixed design. The dependent variables were performance on naming task, i.e. naming consistency, response length, type of descriptors and performance on pile sorting task, i.e. pile similarity.

First, participants were asked for their informed consent. Then, they did both the naming task and the pile sorting task twice, once using stimulus cards with the colors presented in box shape and once using stimulus cards with the colors presented in wine glass shape. It was counterbalanced which task they did first. It was also counterbalanced whether they received box or wine glass stimuli first. During the naming task, the colors were presented one after the other in random order and participants were asked to name the color as quickly as possible. During the pile sorting task, participants were given the same stimuli either in box or wine glass shape and were asked to sort these colors into groups that they found fitting. After completing both tasks twice, participants filled out the questionnaire and the wine knowledge test. They were then thanked for their participation and debriefed.

Later on, audio recordings of the naming task were transcribed and coded according to pre-set guidelines. Full transcribed responses consisted of everything a participant said per stimulus and were used to calculate response length and to code the main responses, thus the actual color words a participant said. These main responses were then grouped into six categories of descriptors: basic colors (terms that stand on their own describing only a color); basic compound (combinations of basic colors); sources (words that describe an object the color is associated with); source compounds (combinations of source terms with another color term); intensity compounds (descriptions including an intensity modifier, e.g. dark); multiple compounds (include both modifiers and a compound). Furthermore, the main responses were used to calculate a consistency score per stimulus for each group and shape separately. The consistency score used in this study was Simpson's Diversity Index[21]. Simpson's Diversity scores range from 0 to 1 with 0 indicating every person gives a unique response and 1 indicating every person gives the same response. These scores were calculated for all responses, thus every color term that a person used during their description. They were also calculated for only the first color term mentioned by each person, but the results of these analyses will not be discussed since they showed the same effects as the analyses of all responses. Performance on the pile sorting task was studied by analyzing the pile similarity of the two groups per shape. The piles were re-structured into similarity matrices in which stimuli sorted into the same group were scored 1 and others were scored 0. This was done iteratively over stimuli and aggregated over participants by group and shape. This resulted in two similarity matrices per group (expert/non-expert) and two per shape (wine/box).

RESULTS

Naming task

Naming consistency as dependent variable was analyzed using a 2x2 ANOVA with group as between-participants factor (expert/non-expert) and shape as within-participants factor (wine glass/box) while correcting for non-normality by log-transforming the scores. The shape-by-group interaction was not significant, $F(1,46)=2.488$, $p=.122$, and neither was the main effect of shape, $F(1,46)=1.522$, $p=.224$. Therefore, experts and non-experts did not differ in their descriptions as result of the shape and shape itself had no influence on how consistent participants were. However, experts and non-experts did differ in consistency as there was a main effect of group, $F(1,46)=4.249$, $p=.045$, with the wine expert group showing lower consistency scores (M=.223; SD=.035) than the non-expert group (M=.317; SD=.035). In conclusion, the naming agreement was influenced only by the factor of expertise with experts being less consistent than non-experts in their descriptions of wine colors.

The dependent variable response length was analyzed similarly using a 2x2 ANOVA with group as between-participants factor (expert/non-expert) and shape as within-participants factor (wine glass/box). A significant shape-by-group interaction effect was found, $F(1,658)=8.674$, $p=.003$. Post-hoc analyses show this effect limits itself to the box stimuli: when describing the stimuli in box shape, experts gave longer responses, $t(658)=9.066$, $p=.003$, than non-experts. This difference in response length, $t(658)=.050$, $p=.822$, is not observed for stimuli in wine glass shape. There was neither a main effect of shape, $F(1,658)=.097$, $p=.755$, nor a main effect of group, $F(1,658)=2.521$, $p=.113$. When colors were presented in box shape, experts gave longer responses and when colors were presented in wine glass shape, the response length was the same for experts and non-experts.

Also, the types of descriptors that experts and non-experts used were analyzed per shape. Chi-square tests of independence showed the difference in amount of basic colors, basic compounds, sources, source compounds and intensity compounds used. Multiple compounds were not taken into the analyses, because neither group used them more than twice. For wine glasses, there was a difference between the groups and their usage of descriptors, $\chi^2(1, N=723)=10.58$, $p=.001$. For boxes, there was also a difference between the groups and their usage of descriptors, $\chi^2(1, N=717)=10.76$, $p=.001$. The wine experts and non-experts thus differed in the types of descriptors they used to describe colors independent of the context. Standardized residuals show experts tended to use more basic compounds for wine glasses (+2.19) and boxes (+1.89). Non-experts used fewer basic compounds for wine glasses (-1.87) and boxes (-1.62). The groups thus seemed to differ in their usage of basic compounds as experts tended to use these more often.

Pile sorting task

To analyze the color categorization, the pile sorting data was structured into vectors which were not normally distributed and therefore, the nonparametric Spearman's correlation index was used. These analyses showed that all four vectors correlated with each other very highly: expert's sorting of wine glass stimuli with non-expert's sorting of wine glass stimuli ($r=.876$, $p<.001$) and with non-expert's sorting of box stimuli ($r=.842$, $p<.001$); expert's sorting of box stimuli with non-expert's sorting of box stimuli ($r=.877$, $p<.001$) and wine glass stimuli ($r=.911$, $p<.001$); expert's box sorting with expert's wine glass sorting ($r=.884$, $p<.001$) and non-expert's box sorting with non-expert's wine glass sorting ($r=.931$, $p<.001$). All in all, expert and non-experts sorted the color stimuli presented in both box and wine glass shape into very similar groups. A hierarchical cluster analysis applying Euclidean distance and between-groups linkage on the aggregated piles confirms that similar colors were grouped together. For both shapes, experts and non-experts distinguished between red and white wine colors, subdividing the white wine colors into two groups: lighter and darker white wine colors and the red wine colors into three groups: light red, more purplish red and darker red wine colors. Thus, experts and non-experts sorted the colors presented in both shapes in highly similar manners.

DISCUSSION

It was studied to what extent wine expertise influences naming and categorization of wine color by comparing experts to non-experts in both an expert and a neutral context. The first hypothesis that descriptions of experts would differ from non-experts in their consistency in only the expert context was partly confirmed. Experts were less consistent, but the decrease in consistency appeared in both contexts. The second hypothesis that descriptions of experts would be longer and more specific in the expert context was also partly confirmed. Experts applied more specific descriptors by using more basic compounds than non-experts. Contrary to expectation this effect was also found for both contexts. Also, experts gave longer responses, but this effect was found in the neutral context instead of the expert context. Finally, the third hypothesis that experts would categorize colors differently than non-experts when presented in the expert context was not confirmed: both experts and non-experts categorized wine colors in each context very similarly. Therefore, the results show that expertise influences color naming, but not categorization. Experts tended to use more basic compounds and were less consistent. Using more specific terms matches previous studies that show experts are more specific and detailed in their wine descriptions[11,14]. It does not, however, match the idea that common vocabulary increases consistency and also not the idea that sensory expertise increases consistency as it might in between-culture comparisons[6,8]. Comparing within-culture expert groups to different between-culture communities is, of course, more complex. Nonetheless, the results of this study suggest that the effects of expertise within cultures are different from the possible effects of expertise between cultures.

In between-culture settings sensory expertise seems linked to using more basic terms and consequently more consistency[6]. In within-culture settings sensory expertise seems linked to using more specific terms and consequently less consistency. If specificity is thus linked to inconsistency, the question arises why experts decide to be specific. It could be to fit the demand characteristics of sounding like an expert. It could also be to convey more information as in the system used by Spanish experts to describe wine color which has been said to maximize information[22]. The wine experts in this study might have also employed an information maximization strategy: basic compounds carry more information than single basic color words. This effect of expertise did not limit itself to the expert context, but seemed generalized to the neutral context as well. In fact, expertise even had effects on response length in the neutral context when there were none in the expert context. Generally, the finding that experts use more words fits previous studies[14], but it is unclear why this effect was found only for the neutral context. Maybe the neutral context was not as neutral as intended since participants knew the study was about wine expertise. The effects of expertise could have generalized to both contexts which does not explain why experts used more words in the neutral context, but it might explain why experts were less consistent and more specific in both contexts instead of only in the expert context.

Both contexts also led to the same results during the categorization task for experts and non-experts. Even though there is an effect of expertise in the verbal domain of color cognition this effect does not emerge in non-verbal color cognition. This takes away from the idea that expertise within cultures could produce linguistic relativity effects similar to those between cultures. That is not necessarily unexpected, however, since experts and non-experts spoke the same language by which their categorizations are likely to be similar. Furthermore, wine colors themselves are simply colors that are already categorized within a language. In fact, the colors used in this study were selected by matching possible wine colors to standardized Color-aid colors. The colors were thus not actual colors of wines, but merely resembled them. This can impact the validity of the results. A replication of the study with actual wine colors could show whether the results hold up in a more natural testing environment.

For now, this study has shown that wine expertise influences color naming, but not color categorization. Wine experts decrease in consistency while using more specific terms, namely basic compounds. Therefore, differences in expertise within a culture seem to have other effects than possible differences in expertise between cultures. These effects are limited to the verbal domain but generalized over neutral and expert contexts. This shows that expertise can influence language and that verbal and non-verbal domains are affected differently.

ROLE OF THE STUDENT

At the time of this research project, Alice Reinhartz was an undergraduate student supervised by Prof. Dr. Asifa Majid. The topic and design were decided upon together. The experiment, analyses and writing of the thesis were carried out by the student herself under supervision of Prof. Dr. Asifa Majid and with the help of Ilja Croijmans.

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